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MINE MECHANIZATION ADVANCES; NONFERROUS MINES LAG

/Numbers in parentheses refer to appended list of sources./

In 1949 - 1950, mechanization in the mining industry increased, but certain nonferrous mines failed to keep up with the trend away from out-dated and labor-consuming methods.

In the mine industry as a whole (ferrous and nonferrous), the drilling of drill and blast holes in underground mines has been completely mechanized; 75 percent of the removal of ore from the working faces, 92 percent of underground haulage along major haulage ways, and 70 percent of filling operations have been mechanized. The basic processes in open-pit mining of medium- and large-capacity pits have been completely mechanized.

The park of machines and equipment for underground and open-pit mining in 1949 - 1950 has increased, over 1948, 89 percent in loading machines, 30 percent in scraper winches, 13 percent in excavators, and 11 percent in drilling machinery. In 1949, metallurgical industry plants produced considerable numbers of pneumatic scraper winches with 3.5-horsepower motors, centrifugal pumps made of acid-resistant stainless steel with 130-cubic-meter capacity per hour, and 2.5-cubic-meter dump cars. In 1950, production will begin of three-drum scraper winches operated by remote control and having 11- to 22-kilowatt-motors, 3.2-ton 1-TL "Liliput" electric locomotives, vertical centrifugal pumps with 75-cubic-meter capacity per hour, PK-40, PK-52 and PK-60 heavy-duty core drilling machines, PP-5 track layers of improved design, rotor excavators for mining refractory clays, etc.

To increase the effectiveness of drilling hard rock and ore, test models of the BS-type percussion-cable drilling machine, with the body of the drilling tool weighing more than 2 tons, have been produced. These machines are now undergoing industrial tests. At the quarries of the Chelyabinsk Mine Administration, in mining refractory clays, banking bridges combined with one-bucket excavators have been built and put into operation for conveying the overburden directly to the worked-out sector. At the Ural iron mines, a KPSh percussion drilling machine designed for underground work has been built.

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In 1950, production of higher-capacity mine equipment will be increased substantially, in particular scraper winches with 20.5-, 25-, and 40-kilowatt motors, PML-5 loading machines, 10-ton mine cars, and others.

Drilling at iron and copper mines is being extensively automatized by the use of automatic feeders and pneumatic support columns. In 1949 - 1950, hand drilling in the iron-ore and copper industries decreased 1½ times. Shallow-hole drilling is being replaced more and more by deep-hole drilling with the use of the NIGRI-4 and GP-1 machines, designed by Engineer Minyaylo, in the mines of the iron-ore, lead and zinc, and copper industries. The use of truck transport in open-pit mining has increased considerably. The experiment in 1949 - 1950 of converting certain mines and shafts to complex mechanization has had outstanding results. Labor productivity per worker in these mines increased 20-25 percent. Scientific research and planning institutes are working to develop effective schemes for mechanizing mining processes and designs of equipment for complex mine mechanization. Laboratory and industrial tests have been made of schemes and apparatus for remote-control operation of the IS-2 scraper winch which can be successfully used in mechanizing ore loading in horizontal slicing workings with square-set timbering and fill, and in mechanizing the transport and leveling of the fill. For top slicing and sublevel caving, a three-drum LSDT-11 scraper winch operated by remote control has been built for transport of ore from those stopes where it is necessary to convey ore at an angle.(1)

The Dzhezkazgan copper mines of the Dzhezkazgan Combine, Karaganda Oblast, have made considerable technical progress in recent years as a result of close cooperation with the Institute of Mining Affairs, Academy of Sciences Kazakh SSR. For example, one of the largest enteprises, Mine No 3, has been completely converted to a new and improved method which has made it possible to mechanize all basic stoping operations and to increase production volume considerably. Labor productivity of the drillers increased 25 percent and that of workers in the stoping groups by 65 percent. Mine No 31 is also being worked by new methods. Both these mines have high-productive scraper winches and scrapers designed by the institute. Much is being done in the mines to install heavy duty drilling apparatus. N. A. Fedorov, associate at the institute, has designed a rig for drilling simultaneously with 12 perforator drills. The combine's machine and repair shop has already built one of these rigs and it will be tested in the mines in the near future. Labor productivity of drillers will be increased 100 percent with use of the rig.

Associates at the institute and the combine's engineers are now working out the radical reconstruction of mining operations and are introducing into the mines such heavy-duty machines as excavators, dump trucks, conveyers, and others. The institute is taking part in almost all research activities undertaken by the combine. A. S. Popov, scientific director of the institute, participated in planning methods of working seams of complex geological structure, and these methods are now being successfully put into practice.(2)

However, the level, established for mining enterprises by the metallurgical industry, for mechanization of haulage and loading of rock in advancing the workings has not been achieved, and lags particularly in mines of nonferrous metallurgy. The mechanization level in underground haulage in nonferrous mines working vein deposits has not been attained. The processes in ore removal and underground haulage in mining enterprises of the refractories industry have been poorly mechanized. The weakest sector of mechanization in iron-ore enterprises is the loading of ore and rock when the development workings are being advanced. These processes are particularly poorly mechanized in mines working horizontal deposits (Tula Mine Administration, Nikopol'-Marganets Trust, and others). In the Krivoy Rog mines, mechanization of ore loading in development work is lagging, as is mechanization of

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auxiliary operations such as loading and unloading of materials both in the mines and on the surface, delivery of materials and equipment to underground workings, and shunting operations in the mine. Crushing of oversize ore pieces is completely unmechanized.

One of the causes for the lag in mechanization is the unsatisfactory utilization of equipment. At nonferrous and iron ore mines, only 60-80 percent of the park of loading machines are in operation, and only 53-55 percent of the scraper winches are active. Necessary conditions for productive and continuous operation of machinery are not provided at many mines. In the quarries of the Yelenovka and Karakunskiy mine administrations, idleness of excavators is as high as 50 percent of working time. At the pits of the Ural iron mines, excavators are sometimes used only 50-60 percent and productivity does not exceed 60,000-80,000 cubic meters per year per one-cubic-meter-bucket capacity. At the Sokolnyy Mine (Vostochno-Kazakhstan Oblast) wheelbarrows are used occasionally in mining by the top-slicing or room and pillar method, although the mine has a sufficient quantity of scraper winches of various sizes.(1)

Among other nonferrous mines at which mechanization is still on a low level is the Leninogorsk Lead and Zinc Mine. The mine was the only enterprise of the Leninogorsk Polymetallic Combine which failed to meet its May production plan, falling short of the plan by many thousand tons of lead and zinc ores. Its work was no better in June. Until May, the mine had been completing its monthly plans and labor productivity was above plan. The organization of labor has grown worse and the production schedule is continually violated. The miners' idleness caused by lack of preparation of the stopes has grown to mass proportions, and the mine directors continue to adhere strongly to old work methods. Until just recently, all ore-blasting was done with shallow blast holes. Under this system, the blasters blast the stope two or three times per shift, thus interrupting the work of the miners and decreasing their productivity. The blasting schedule has since been changed to the degree that it is now done at the end of the shift, but the old system of shallow blast holes is still used. Mikhaylenko, director of the mine, does not approve of the deep-blast-hole method and has done nothing to further its use in the mine.

The technical ineptitude of the mine directors is apparent also in the inefficient use of mine equipment. According to plan, 50 percent of the ore from the stopes is to be loaded by machine. However, in May, only 4.2 percent of ore removal has been mechanized. The main ore-loading equipment, the scraper winches, are utilized no more than 5-percent. Snytin, chief mechanical engineer, and the heads of the mine sectors make no effort to provide for the use of machines. They consider it a usual occurrence when ore is reloaded two or three times by shovel. In the fifth section, for example, scrapers have been shunted around from block to block for 2 months without once being used. In May, as compared with April, the number of underground workers increased by 100 miners, but the volume of ore mined went down considerably. Labor productivity of miners is only 80 percent of plan.

The directors have taken no steps to cope with the decreasing production level except for formalistic administrative decrees. For example, when the second section failed to meet its April plan and continued to lag in May, Mikhaylenko merely abolished the section and reduced its foreman to the status of miner. Bogatov, director of the Polymetallic Combine, has taken no interest either in this matter or in any of the other grave shortcomings of the mine's directors.(3)

A similar condition prevails at the Tekeli Mine, Taldy-Kurgan Oblast, where worker idleness constitutes more than 30 percent of working time. Idleness of workers in the main professions -- among drillers and haulers -- is particularly high. The time spent by drillers in basic work is only 41 percent of total work time, and for haulers is somewhat less than this.

The mine administration has done nothing to further the improved method of complex brigades, which, even under the organizational morass at the mine, would have been able to cut idleness in half. The administration has the habit of switching miners from brigade to brigade and from place to place, so that in one month's time, a total of 56 miners were sent to work on one complex brigade -- almost four times the permanent staff of the brigade. Much time is spent in teaching workers new skills and duties as the result of the administration's policy. The mass of minor shortcomings prevalent in the mine disrupts the entire productive life of the enterprise and causes continual idleness, so that the majority of workers are not meeting their norms. The method by which the administration makes up for these losses in an effort to attain the prescribed work level is quite simple. At the end of the month, the entire management of the combine, headed by Grishin, director of the combine, visits the mine and decides which of the stopes can be mined most easily. Then the miners and materials are sent to that stope and a big drive gets under way to make up the losses of the rest of the month. In May, the average figure for ore output for the mine was almost at the planned level, while at the eastern section only 59 percent of the task was completed and output at other sectors was likewise reduced.(4)

In the Kirgiz SSR, the level of mechanization of heavy work -- removal and haulage of ore -- at the Khaydarken Combine in the first quarter 1950 did not exceed 20-40 percent. The existing equipment is poorly utilized. According to the 1949 mechanization plan, the enterprise should have had 12 winches, while actually it only has eight, with only four operating. The rest are not used due to lack of cable, motors, and reducers. The two loading machines which were received are not being used as prescribed.(5)

For the mining industry as a whole, some of the most necessary steps for successful adoption of complex mechanization, which is in itself the most important task in mechanizing mine operations, are as follows:

1. Provide immediately the correct planning blueprints for those mines which are being converted to complex mechanization

2. Introduce on a wide scale in stoping and development workings heavy-duty drilling machines for drilling horizontal and inclined holes and telescopic drilling machines for boring drill holes in raises; achieve complete automatization of drilling by extensive use of automatic feeders and pneumatic support columns, and considerably expand the field for utilization of deep-hole drilling

3. Insure production of heavy-duty drilling machines, the type of drills needed for deep-hole drilling in hard ore, and a durable drill tool for underground workings.

4. For loading and conveying ore in the stopes, install light-duty three-drum scraper winches with 5- to 11-kilowatt motors in mines worked by top slicing; install medium (20-kilowatt) scraper winches and heavy-duty (45-kilowatt) winches in accumulation workings and in scraper-loading cross-drifts in mining by the open-stope and wide-front systems; and also utilize remote-control operation of scrapers in mining by rooms and in scraper loading at an angle

5. Insure the designing and production of test models and machines for mechanizing the loading and conveying of ore in working horizontal deposits, and also a test model of a light-duty loading machine for small workings in mines working veiny deposits

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6. Make extensive use of machines and equipment which will speed auxiliary operations in advancing horizontal workings: pneumatic reloaders for mine cars, extension-type rails, mobile band conveyers

7. Expand the use of pneumatic loaders of the BCh-1 type for mechanization of rock loading and in advancing and sinking mine shafts

8. Develop loading machines with large-capacity buckets for use in mines working deposits by the open-stope method

9. Supply to mines a sufficient quantity of cars for underground haulage, install large-capacity cars in large mines and also trolley-type electric locomotives with a weight on drivers of 10 tons

10. Develop the design of a mobile metal mold for use in concreting horizontal workings with the use of metallic elements and reinforced concrete slabs, which will be easily assembled at the place of installation.

To improve the management of mechanization work, special bureaus should be created at large enterprises. The creation of a specialized institute for designing new mine machines within the Ministry of the Metallurgical Industry should also be considered. Construction of new machine-building plants and repair bases should be stepped up.(1)

SOURCES

1. Gornyy Zhurnal, No 7, Jul 50

2. Kazakhstanskaya Pravda, No 118, 4 Jun 50

3. Kazakhstanskaya Pravda, No 139, 29 Jun 50

4. Kazakhstanskaya Pravda, No 131, 20 Jun 50

5. Sovetskaya Kirgiziya, No 121, 20 Jun 50

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